

APPENDIX B RGB COMPOSITES

The following Red Green Blue (RGB) Color Composites have been selected due to their spectral content. They are useful to an analyst in Cloud Type determination as well as Cloud vs. Snow/Ice background discrimination. These RGBs have been generated using 3 MODIS Airborne Simulator (MAS) scenes from the SUCCESS and ARMCAS Campaigns. The features identified in each RGB are explained in the subcaption.

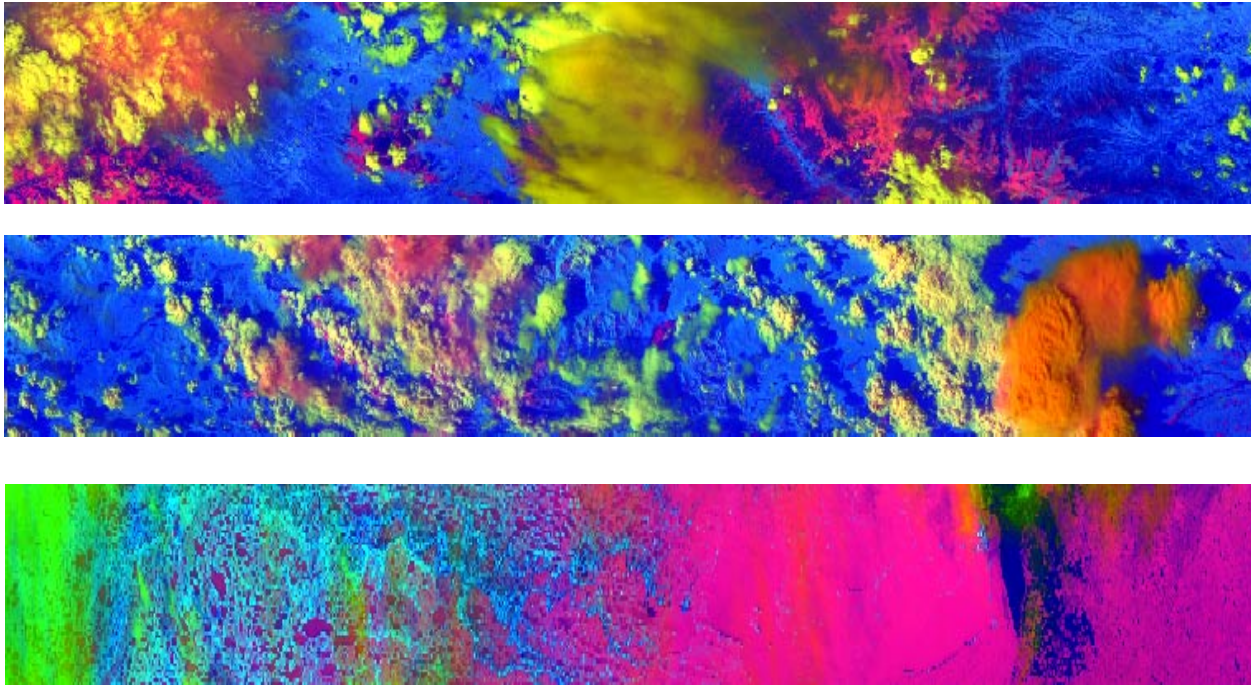


Figure B-1. RGB (0.645, 1.61, BT10.8/BT12.0)

Using this RGB composite snow/ice surfaces are rose to purple, low clouds are yellow, high (water) clouds range from yellow to green, thin cirrus over snow/ice is orange in coloration, and vegetated land is blue. The thundercloud in the middle scene is believed to be orange due to the high reflectance in the visible and absorption in the near IR of the ice contained at its upper levels.

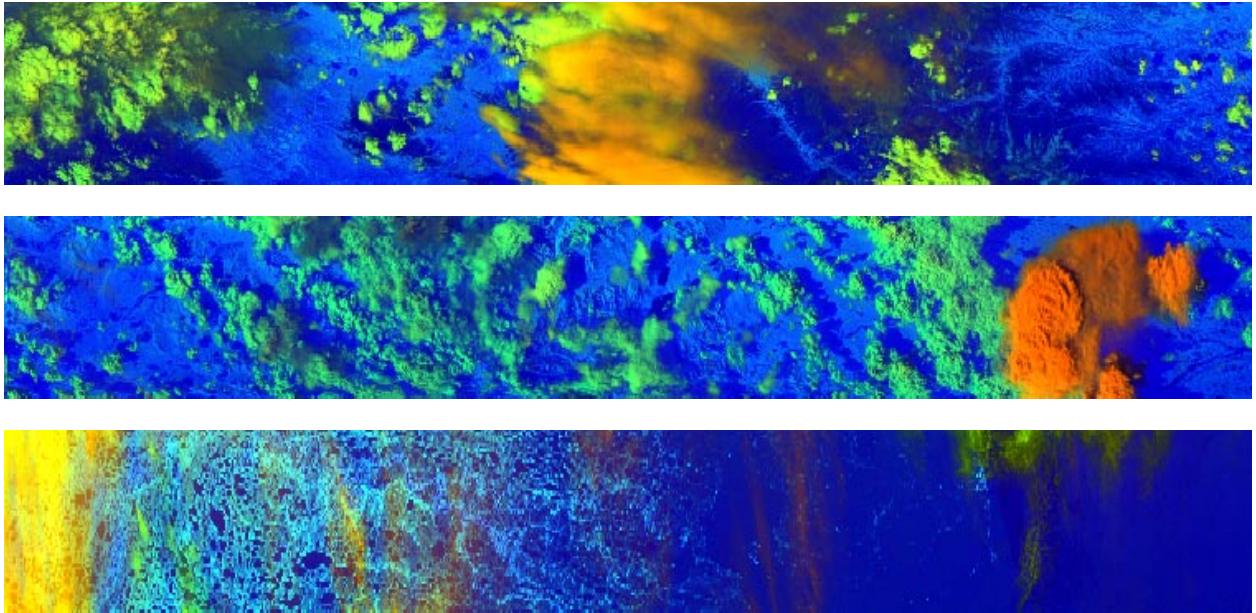


Figure B-2. RGB (1.38[1.88], 1.61, 12.0)

Using this RGB composite masks out snow ice fields making them the same coloration as vegetated land. Land with a low amount of vegetation tends to be aqua blue. Optically thin cirrus has a deep bluish hue, lower level water clouds appear greenish, optically thick cirrus are more golden to orange in coloration. Overshooting tops such as the thundercloud in the middle figure appear orange in coloration.

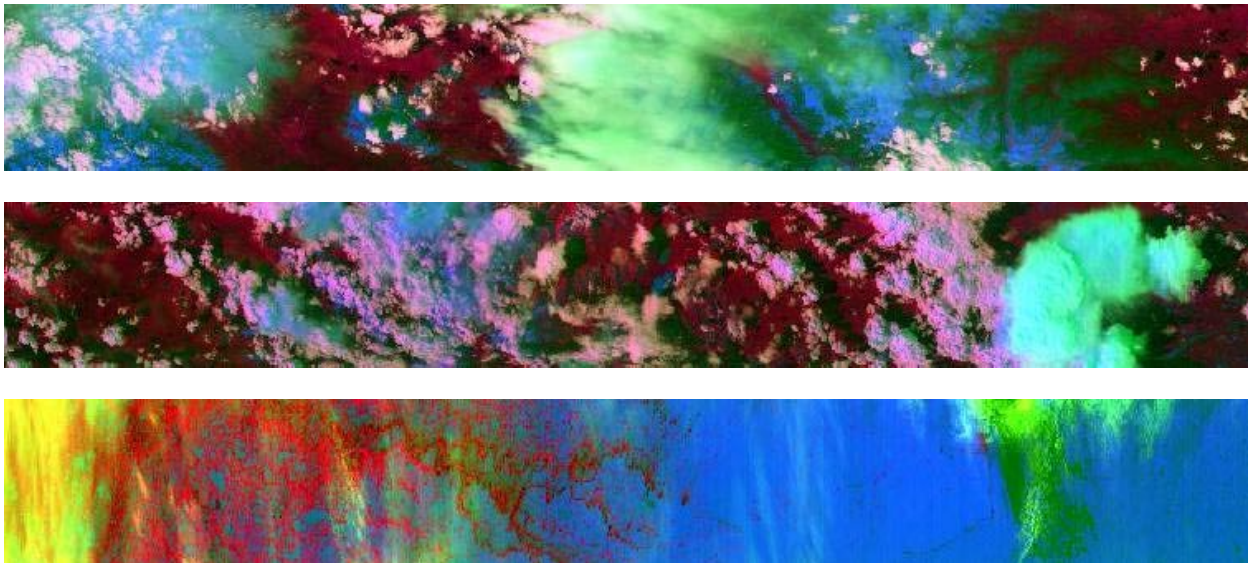


Figure B-3. RGB (1.61, Invert BT8.6, 0.645)

Using this RGB composite one can distinguish between lower level cumulus and upper level cirrus and snow/ice fields. Snow/ice fields are blue. Optically-thin cirrus has a yellow-greenish-turquoise hue, lower-level water clouds are rose to white, overlaying mid-level water clouds are darker blue. Vegetated surfaces are red in coloration.

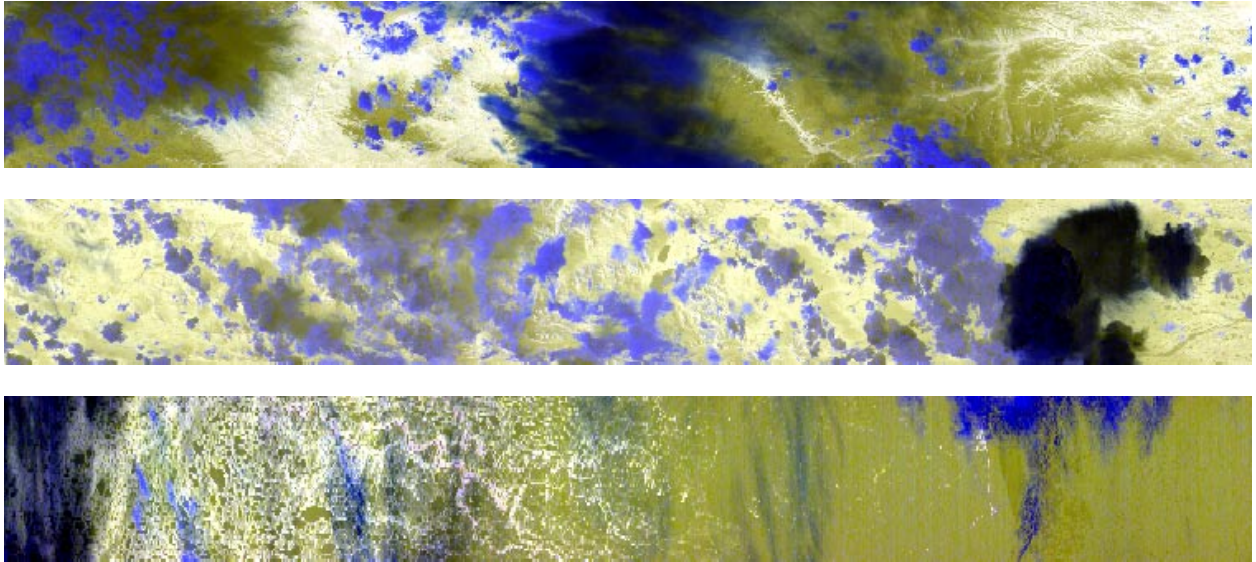


Figure B-4. RGB (BT11, BT8.6, BT3.75)

Using this RGB composite one can distinguish between lower level Cumulus and upper level Cirrus and snow/ice fields. Snow/ice fields are olive-green, optically thin cirrus has a deep blue-blackish hue over land and blue over ice, lower level water clouds are dark blue, vegetated regions tend to be white. Overshooting tops such as the thunderstorm in the middle figure appear black with clearly defined boundaries, and cellular structure clearly visible.

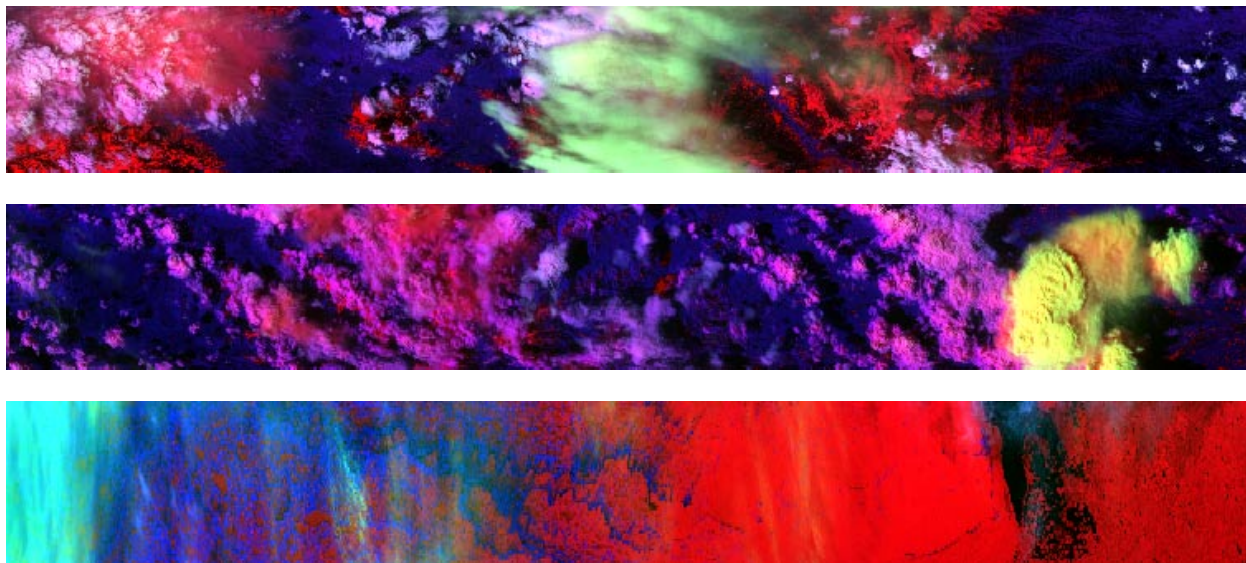


Figure B-5. RGB (0.645, 1.38[1.88], 1.61)

Using this RGB composite allows distinction between lower level cumulus and upper level cirrus and snow/ice fields. Snow/ice fields are red in coloration, optically-thick cirrus is green in coloration and thin cirrus is aqua blue, lowest level water clouds appear dark purple, while middle level appear pin. Overshooting tops from thunderstorms, such as the middle figure, appear yellow with lower cellular structure being orange.

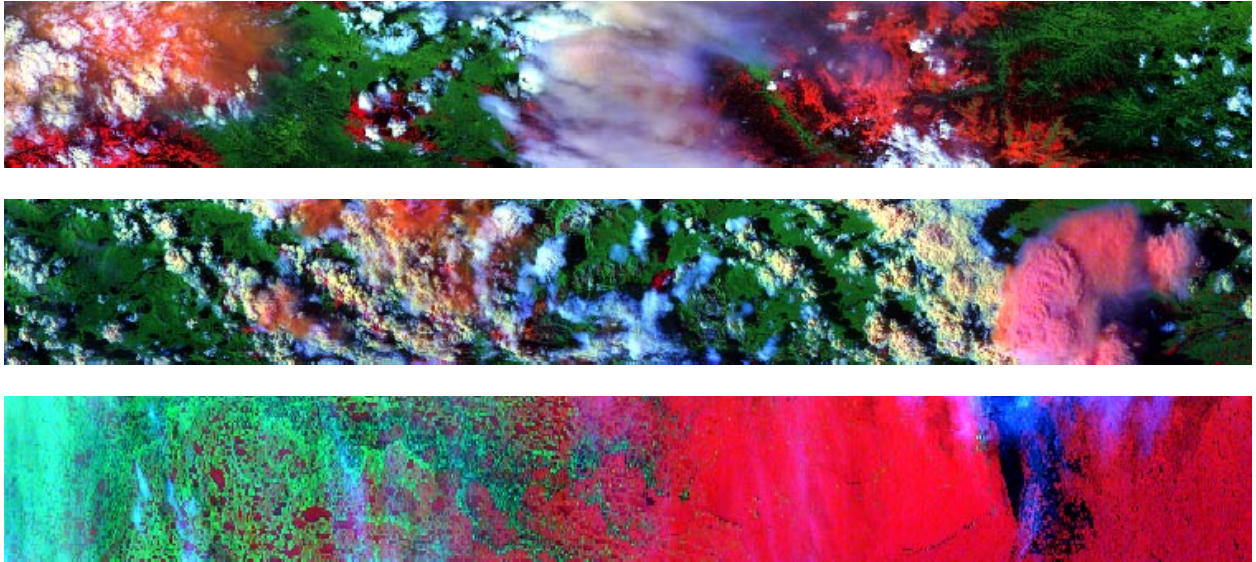


Figure B-6. RGB (0.645, 1.61, 3.75A)

Using this RGB composite vegetated land is green, low level water clouds are white, high level cirrus are Grey blue, snow/ice is bright red, and thin cirrus over snow/ice is pink to purple, while over vegetated land it is aqua green. The thundercloud in the middle scene is pink in coloration.

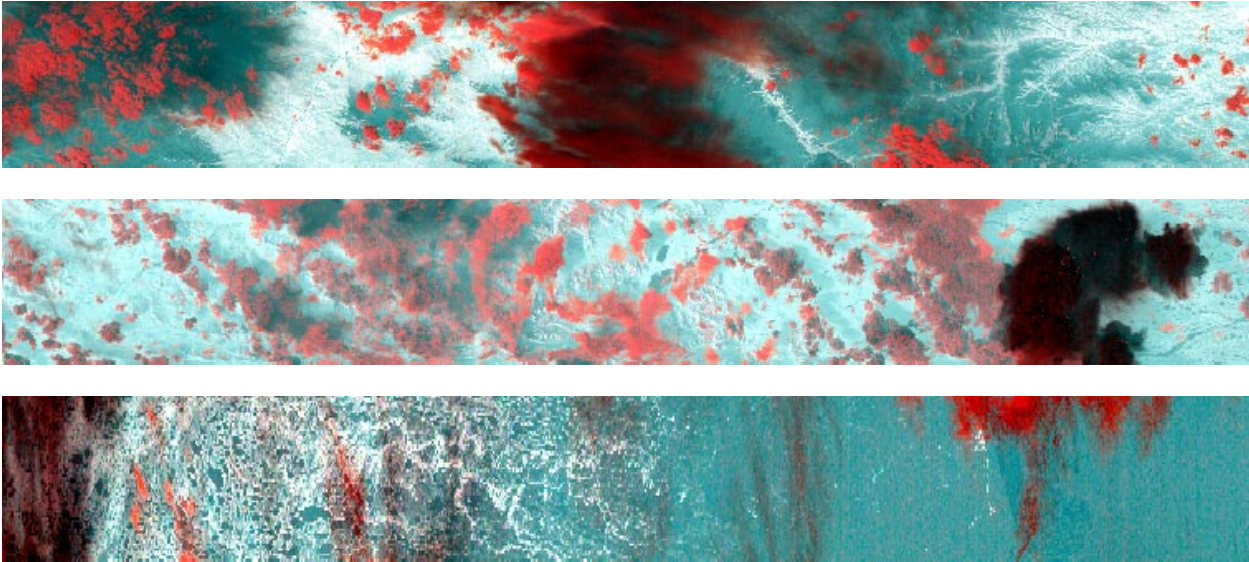


Figure B-7. RGB (BT3.75, BT10.8, BT12)

Using this RGB composite snow/ice surfaces are blue-gray, water clouds are bright red over vegetated land, cirrus covered regions are black to gray, thin cirrus over ice is bright red, and vegetated land is white. The cells of the thundercloud in the middle image are clearly visible.

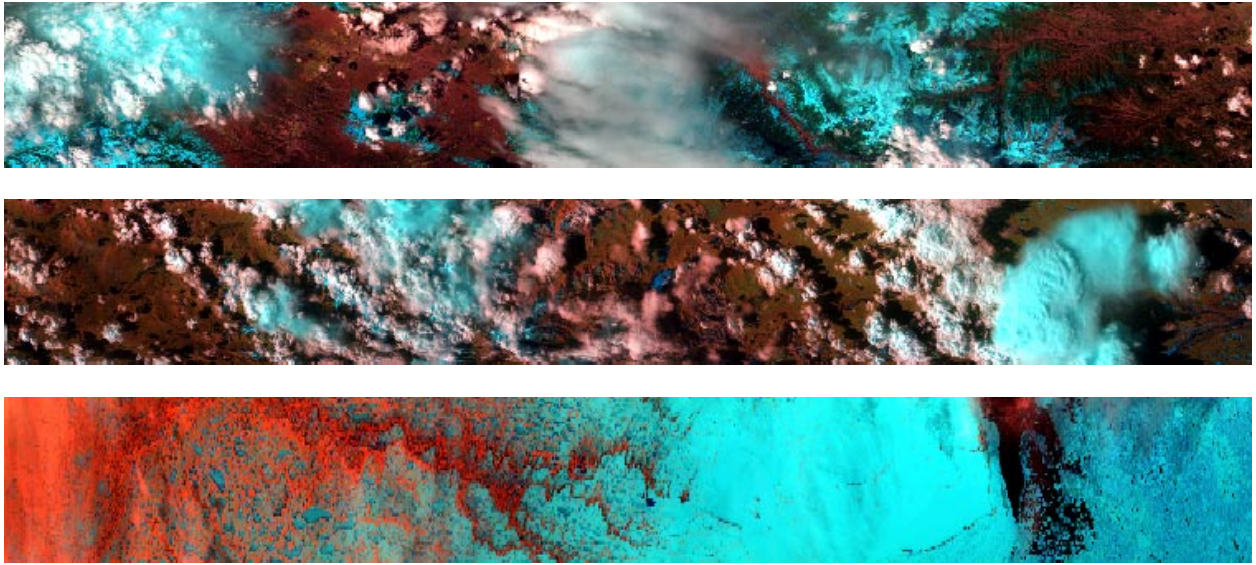


Figure B-8. RGB (2.1/1.6, .845, .645)

Using this RGB composite snow/ice surfaces are aqua blue, clouds are white, vegetated land is red, and highly vegetated land such as irrigated regions are green. Above note the middle thundercloud scene optically thin clouds over snow/ice surfaces and clouds that contain a large quantity of ice crystals may be blue in coloration.

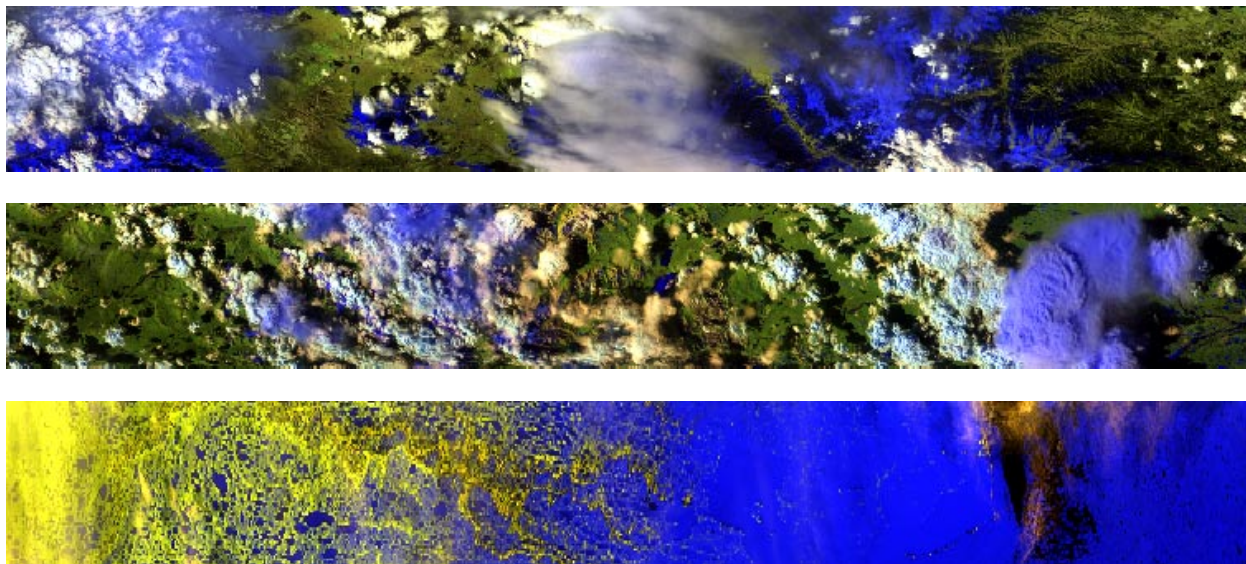


Figure B-9. RGB (2.1, 1.6, .645)

Using this RGB composite snow/ice surfaces are dark blue, water clouds are white, vegetated land is green, and highly vegetated land such as irrigated regions are dark green. Above note the middle thundercloud scene optically thin clouds over snow/ice surfaces and clouds that contain a large quantity of ice crystals may be blue in coloration. The vegetated regions with this RGB combination also tend to exhibit greater contrast, due to the range of reflectances that vegetated surfaces may have in the near IR bands.

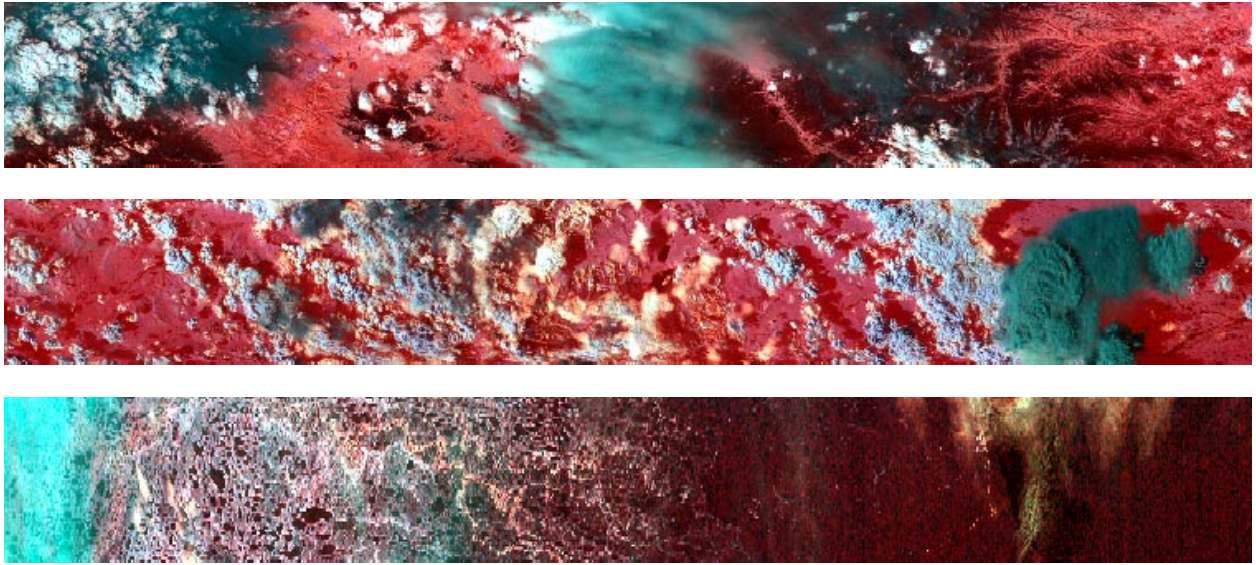


Figure B-10. RGB (BT3.75, 2.1, 1.6)

Using this RGB composite vegetated land is bright red and snow/ice surfaces are dark black. Low level water clouds are white, while higher level cirrus clouds are blue when optically thin and grayish blue when optically thick. This variation in coloration for higher and lower level clouds allows visual discrimination between them.

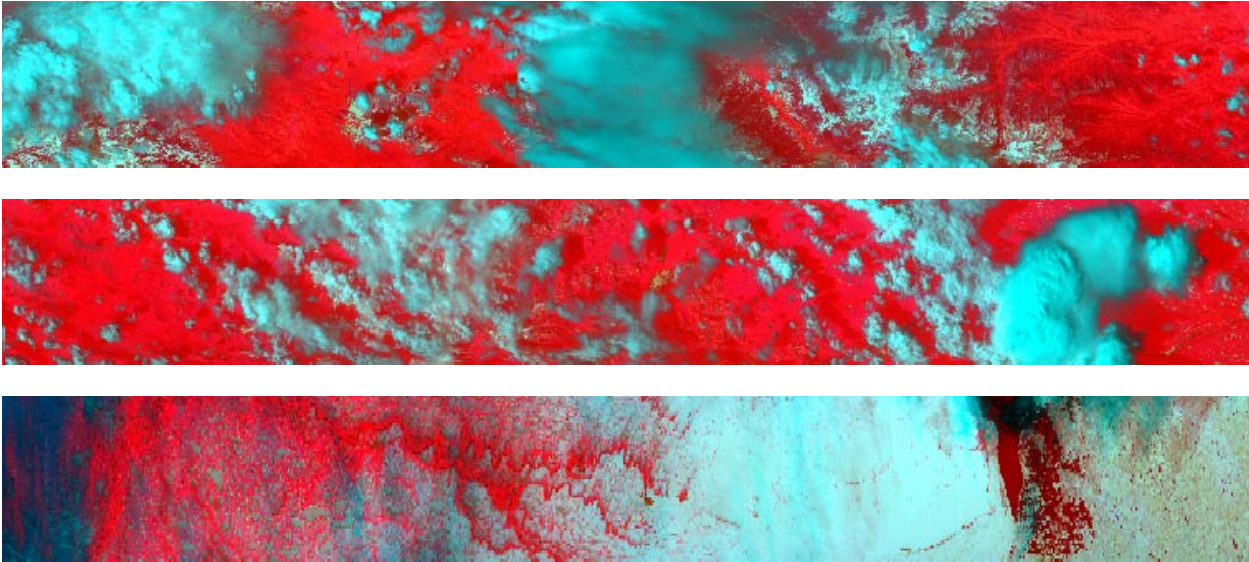


Figure B-11. RGB (BT8.6, .645, .845)

Using this RGB composite snow/ice surfaces are aqua blue as are clouds, vegetated land is very bright red. Optically thin cirrus over vegetated land and water are purple in coloration. Optically thick cirrus tends to be grayish blue. Caution: it is possible to confuse clouds with snow/ice with this combination.

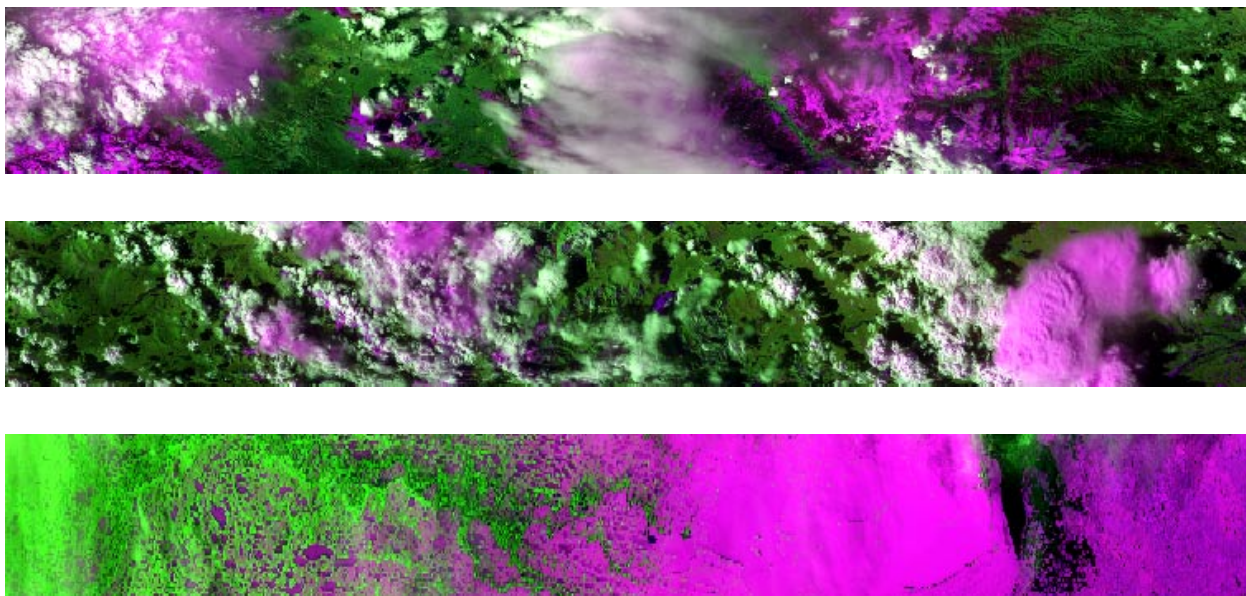


Figure B-12. RGB (.86, 1.61, .645)

Using this RGB composite snow/ice surfaces are purple, while water clouds are white, vegetated land is green. Optically thin cirrus over land is green in coloration and tends to blur the underlying surface features. Optically thick ice clouds are purple to gray.

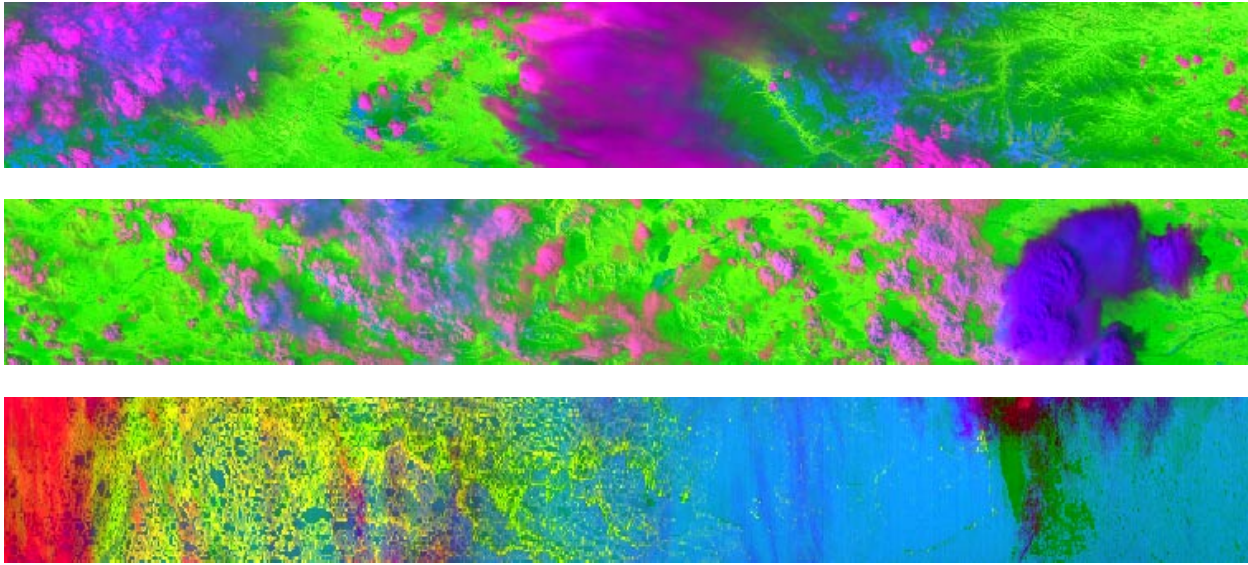


Figure B-13. RGB (1.61, BT8.6, .645)

Using this RGB composite brings out dramatic differences within a scene. Clouds are purple to dark blue, the bluer the clouds are the more ice that they contain. Cellular structure in thunderclouds is discernable. Thin cirrus may be red in coloration over vegetated land. Snow ice surfaces are light blue, while vegetated land is bright green and sparsely vegetated land is dark green. Snow visible through clouds takes on a darker blue coloration than the clear snowy regions.

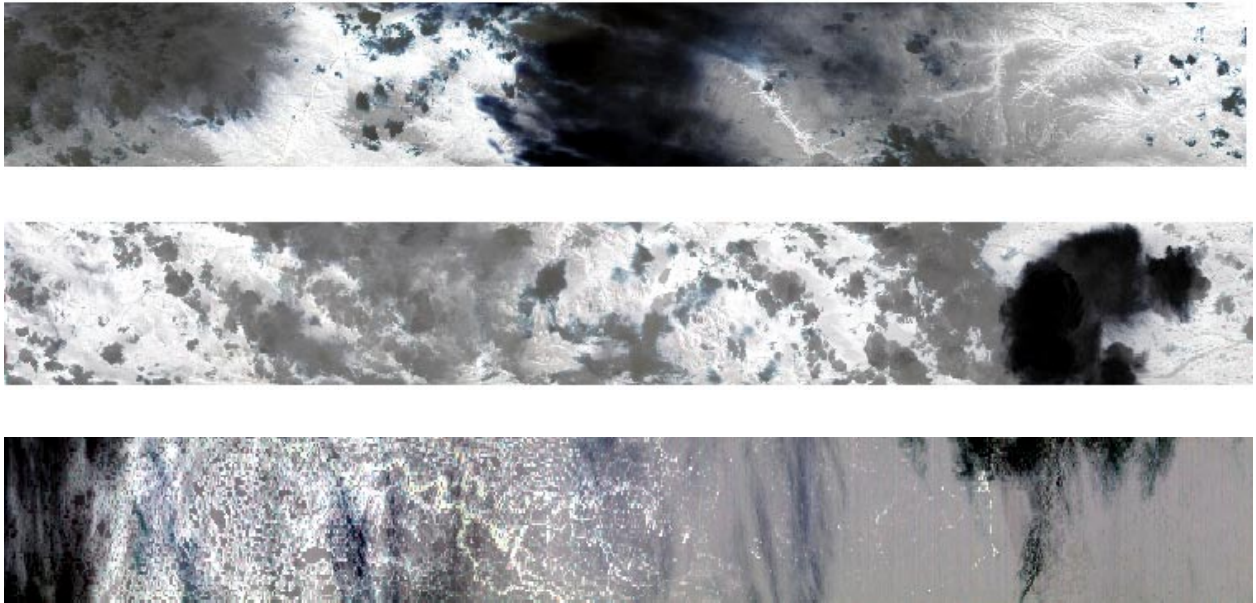


Figure B-14. RGB (BT12, BT11, BT8.6)

Using this RGB composite generates an image that is almost gray scale at first glance. However, due to the thermal contrast of clouds over underlying surfaces an analyst can notice them. Vegetated land is white in coloration, lower level water clouds are Gray in coloration, higher level cirrus are black in coloration, snow/ice surfaces are Gray in coloration, and optically thin cirrus can have a blue hue to them. The thermal contrast in the middle scene allows one to visually separate out the cellular structure of the thundercloud.

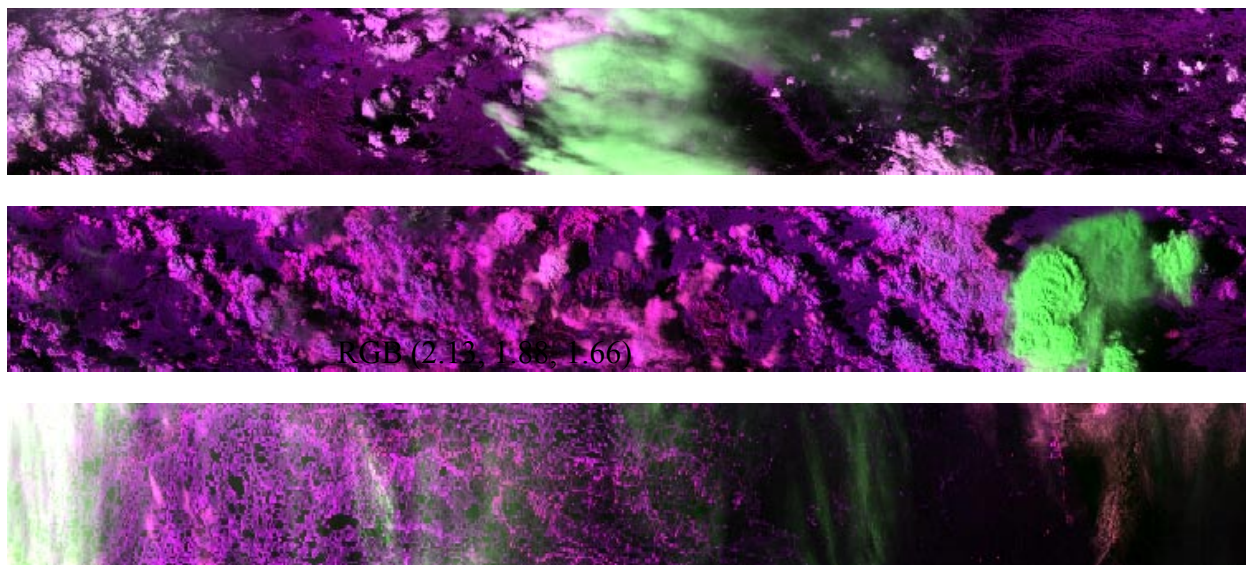


Figure B-15. RGB (2.13, 1.88, 1.66)

Using this near-IR RGB composite snow ice surfaces are black, while vegetated land is black to purple. Lower level water clouds are purple and higher clouds such as cirrus and thunderclouds tend to be from green to white in coloration. The whiter the cirrus is the more optically thin it is. This composite is good to use over an ice-covered region to discern clouds from snow/ice and to look for higher cloud presence.

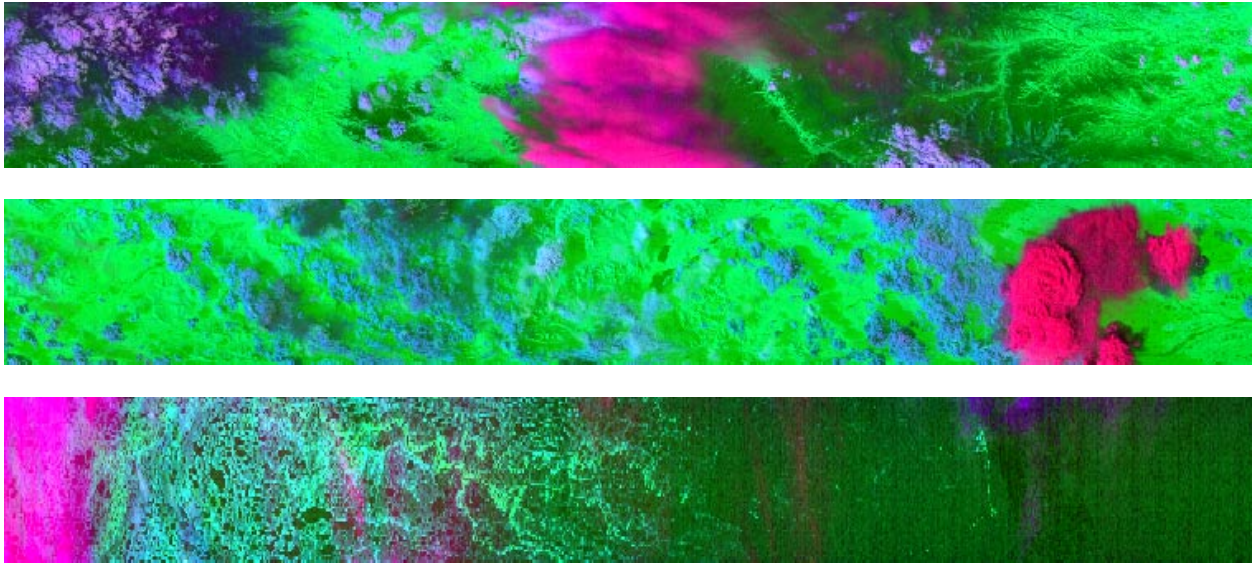


Figure B-16. RGB (1.88, BT4, 1.61)

Using this RGB composite snow/ice surfaces are dark green, lower level water clouds are light blue to dark blue, vegetated land is bright green, with less vegetated being dark green, cirrus over snow and ice is black in coloration, high level cirrus clouds are purple in coloration. Above note the middle thundercloud scene the cellular structure and edges of this cloud is apparent and the coloration is reddish-purple.

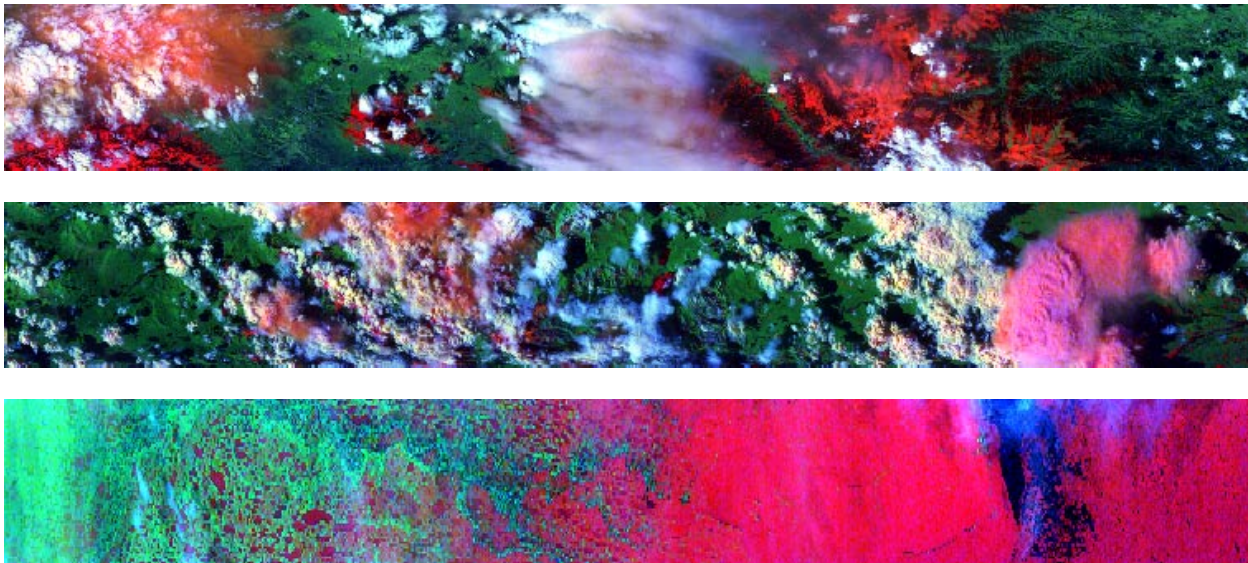


Figure B-17. RGB (.645, 1.61, BT3.75-BT4.0)

Using this RGB composite snow/ice surfaces are red, low level water clouds are white, vegetated land is green, thin cirrus are red to Gray in coloration, however over some regions they tend to be the same coloration as the underlying surface but blur the surface features. Thin cirrus over water is blue-purple while over snow/ice it is pinkish colored. Thunderclouds tend to be pink in coloration.